

PATENT SPECIFICATION

DRAWINGS ATTACHED

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Date of filing Complete Specification: 1 Sept., 1967.

Application Date: 2 Sept., 1966.

Complete Specification Published: 19 March, 1969.

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L146.193

No. 39307/66.

L146.193



Index at acceptance:—B8 H(34A, 34B)

Int. Cl.:—B 66 c 1/28

COMPLETE SPECIFICATION

Lifting Frame for Engaging Loads

We, HERBERT MORRIS LIMITED, a British company, of Empress Works, Loughborough, Leicestershire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a lifting frame for engaging loads, such as timber or other materials, goods, pallets, containers or the like. When lifting timber or other goods or articles by means of a crane, there is frequently a need for a lifting frame which can engage the timber or articles without there being any need for manual interference such as wrapping a chain or rope around the timber or articles for engagement by the crane.

The invention consists in a lifting frame for timber or for other materials, goods, pallets, containers or the like, having a generally rectangular frame provided at each corner with a foot which can revolve about a substantially vertical axis through an angle of approximately 90° or more, this enabling the lifting frame to be deposited over a load with the feet in a position such as not to obstruct the load, means being provided for rotating the feet so as to engage under the load and thereby enable the load to be picked up and carried by the lifting frame.

Preferably, the feet are carried by downwardly extending shafts mounted at the corners of the frame. The shafts may be disposed within tubular posts provided at the corners of the frame. The shafts are rotatably mounted whereby to enable rotation of the feet. Preferably, the shafts each carry a pulley, a rope or cable being entrained around all of the pulleys and around a pulley carried by a drive motor, the motor being reversible whereby to enable reversal of the direction of rotation of the feet.

One or more limit switches may be provided for controlling the operation of the motor. Two limit switches may be provided, which

are actuated by an arm carried by one of the shaft pulleys or carried by the shaft, one of the limit switches being actuated by the arm when the feet are in their non load-obstructing position, and the other limit switch being actuated when the feet are in their load-obstructing position. Alternatively, each shaft may be arranged for being driven by a separate motor, for rotating the feet.

Advantageously, the rectangular frame forms the lower part of a framework the upper part of which is provided with pulleys or other attachment formations enabling it to be engaged by a crane cable, chain or the like, the rectangular frame being rotatably secured to the said upper part. The lower part may be provided with an internally toothed ring which is engaged by a pinion driven through a reduction gear by an electric motor carried by the upper part. Limit switches may be provided for automatically limiting the degree of rotation given to the lower part relative to the upper part.

In order to make the invention clearly understood, reference will now be made to the accompanying drawings which are given by way of example and in which:—

Fig. 1 is an elevation view of the lifting frame of the invention;

Fig. 2 is a side view of the grapple, in the direction from the left hand side of Fig. 1;

Fig. 3 is a sectional view along the line III—III of Fig. 1;

Fig. 4 is a fragmentary sectional view along the line IV—IV of Fig. 1, to a larger scale than Fig. 1; and

Fig. 5 is a plan view of the upper framework part of the lifting frame.

The lifting frame for engaging timber or other loads, comprises a framework 1 having an upper part 2 and a lower part 3. The upper part 2 is provided with pulleys 4 or other attachment formations enabling it to be engaged by a crane cable, chain or the like 6, the lower part 3 being rotatably secured to the upper

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part 2. For this purpose, the lower part 3 is provided with an internally toothed ring 7 which is engaged by a pinion 8 driven through a reduction gear 9 by an electric motor 10 carried by the upper part 2. Limit switches 12 are provided for automatically limiting the degree of rotation given to the lower part 3 relative to the upper part 2.

The lower part 3 has downwardly extending post-like formations 13 at its corners, the post-like formations 13 having shafts 14 rotatably disposed therein. At its lower end, each shaft 14 carries a laterally extending foot 15 and at its upper end each shaft 14 fixedly carries a pulley 16. The pulleys 16 are entrained by a cable 17 which also passes over a winding drum 18 arranged for being driven through a reduction gear 19 by an electric motor 20. Limit switches 22 operable by an arm 23 fixed to the upper end of one of the shafts 14 are provided for controlling operation of the motor 20.

Known means (not shown) may be provided for maintaining a suitable amount of tension in the cable 17 which is entrained over the pulleys 16.

The lifting frame operates as follows:—

A crane carrying the lifting frame by its upper part 2, by means of a cable or chain 6 preferably secured to the crane in such a way as to discourage swinging, is operated so as to bring the lifting frame into a desired position relative to a load of timber, or some other load, to be engaged. Prior to this, the motor 20 driving the cable 17 which is entrained over the various pulleys 16 is operated so as to bring the lateral feet 15 into positions lying clear of the load to be engaged. When now this motor 20 is operated to rotate the feet 15 into the load engaging position, the entrained cable 17 is driven and thereby the four vertically extending shafts 14 and the lateral feet 15 carried at the lower ends thereof are actuated. Consequently, the laterally extending feet 15 are swung into positions below the engaged load, this representing a 90° rotation of the shafts 14, the said rotation being terminated by appropriate actuation of the respective limit switch 22.

The crane can now be operated to transport the engaged load to any desired place for deposit of the load and if it is required that the load should be deposited in a different orientation to its orientation when engaged, then before deposit of the load, the lower part 3 of the lifting frame is rotated through the desired amount relative to the upper part 2 of the grapple, this rotation being effected by operation of the motor 10 which drives the pinion 8 engaging the internally toothed ring 7. The limit switches 12 provided for automatic termination of this slewing movement may be used to terminate the movement, or if variable amounts of slewing movement are required, the limit switches may be by-passed.

Various modifications are possible within the scope of the invention, as defined by the claims, and the description of the above embodiment is given by way of example only. In accordance with one such modification, individual motors may be provided for rotating the vertically extending shafts 14, or means other than electric motor drive may be provided for rotation of these shafts.

WHAT WE CLAIM IS:—

1. A lifting frame for timber or for other materials, goods, pallets, containers or the like, having a generally rectangular frame provided at each corner with a foot which can revolve about a substantially vertical axis through an angle of approximately 90°, or more, this enabling the lifting frame to be deposited over a load with the feet in a position such as not to obstruct the load, means being provided for rotating the feet about the said axes so as to engage under the load and thereby enable the load to be picked up and carried by the lifting frame.

2. A lifting frame as claimed in claim 1, wherein the feet are carried by vertically extending shafts mounted at the corners of the generally rectangular frame.

3. A lifting frame as claimed in claim 2, wherein the shafts are disposed within tubular posts provided at the corners of the generally rectangular frame.

4. A lifting frame as claimed in claim 2 or 3, wherein the shafts are rotatably mounted whereby to enable rotation of the feet.

5. A lifting frame as claimed in claim 4, wherein the shafts each carry a pulley, a rope or cable being entrained around all of the pulleys and around a pulley carried by a drive motor, the motor being reversible whereby to enable reversal of the direction of rotation of the feet.

6. A lifting frame as claimed in claim 5, wherein one or more limit switches are provided for controlling the operation of the motor.

7. A lifting frame as claimed in claim 6, wherein two limit switches are provided, which are actuated by an arm carried by one of the shaft pulleys or carried by the shaft, one of the limit switches being actuated by the arm when the feet are in their non load-obstructing position, and the other limit switch being actuated when the feet are in their load-obstructing position.

8. A lifting frame as claimed in claim 4, wherein each shaft is arranged for being driven by a separate motor, for rotating the feet.

9. A lifting frame as claimed in any one of claims 1 to 8, wherein the generally rectangular frame forms the lower part of a framework the upper part of which is provided with pulleys or other attachment formations enabling it to be engaged by a crane cable, chain or the like, the generally rectangular frame being rotatably secured to the said upper part.

10. A lifting frame as claimed in claim 9,

wherein the lower part is provided with an internally toothed ring which is engaged by a pinion driven through a reduction gear by an electric motor carried by the upper part.

- 5 11. A lifting frame as claimed in claim 10, wherein limit switches are provided for automatically limiting the degree of rotation given to the lower part relative to the upper part.

- 10 12. A lifting frame for timber or other materials, constructed and arranged substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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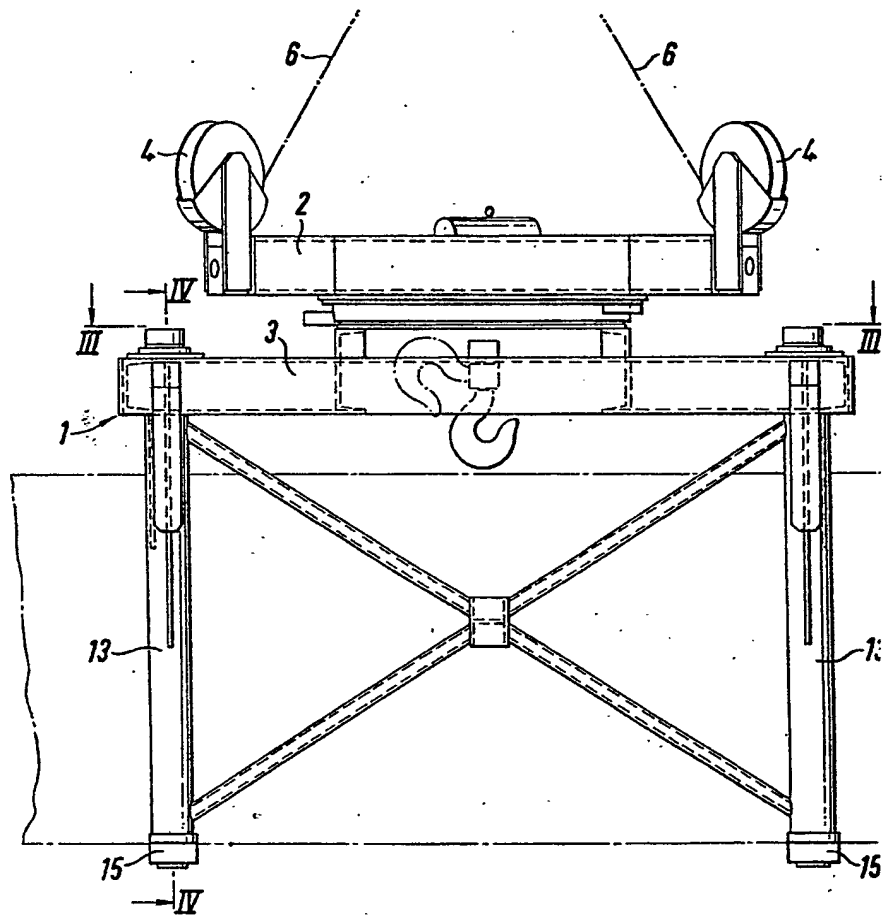
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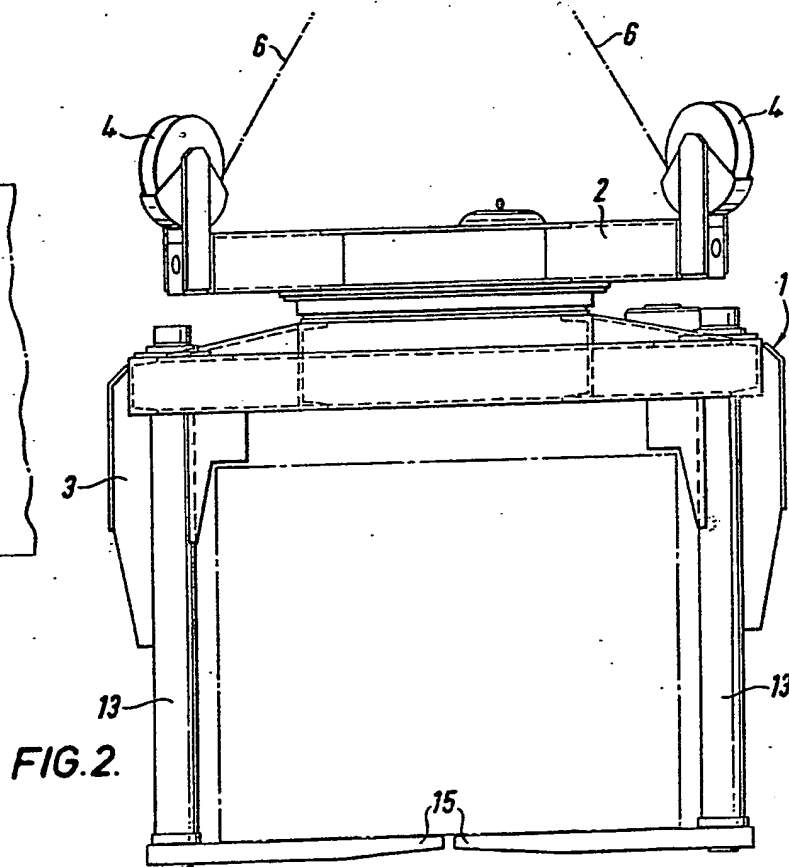
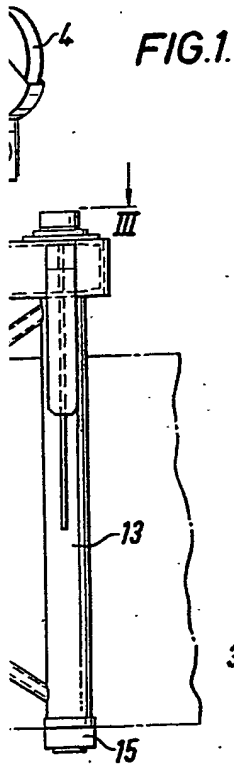
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Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1969.
Published by the Patent Office, 25 Southampton Buildings, London, W.C.2, from which
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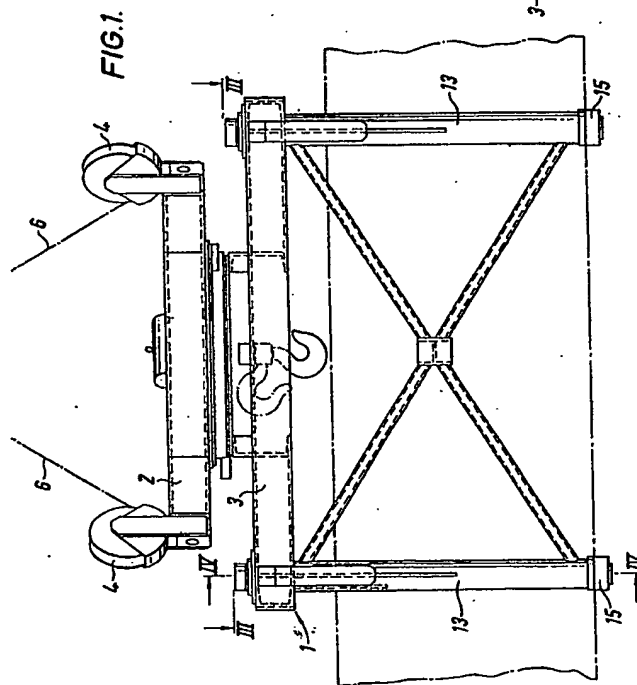


FIG. 1.

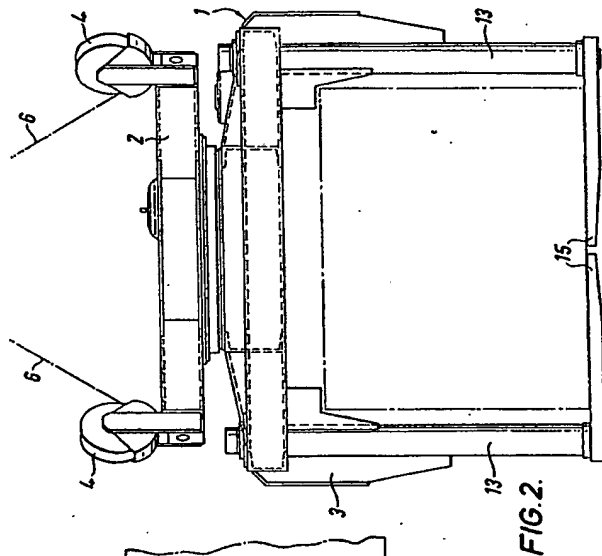


FIG. 2.

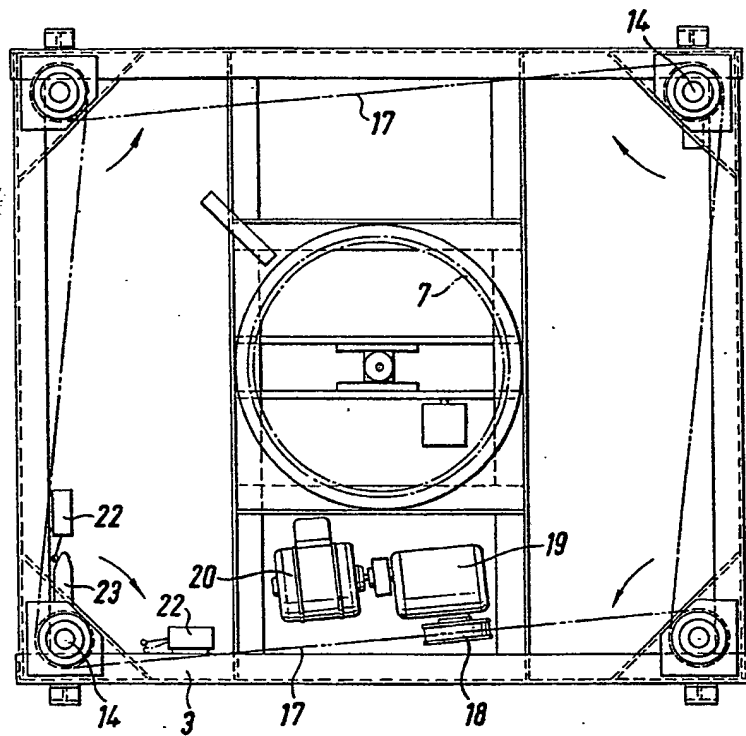


FIG.3.

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Sheets 2 & 3*

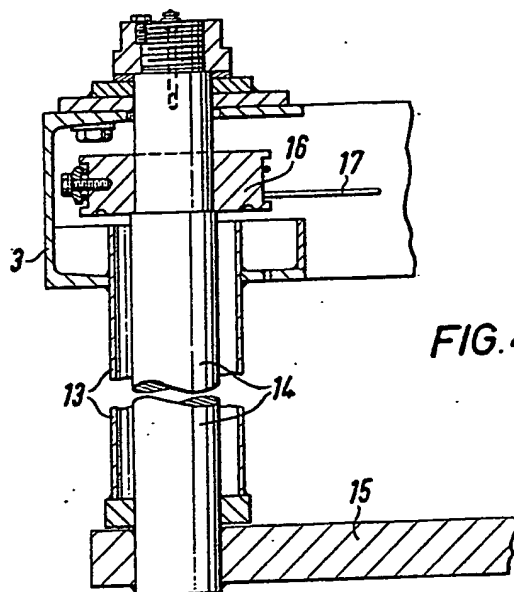
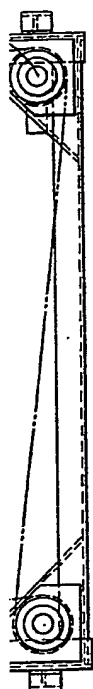


FIG. 4.

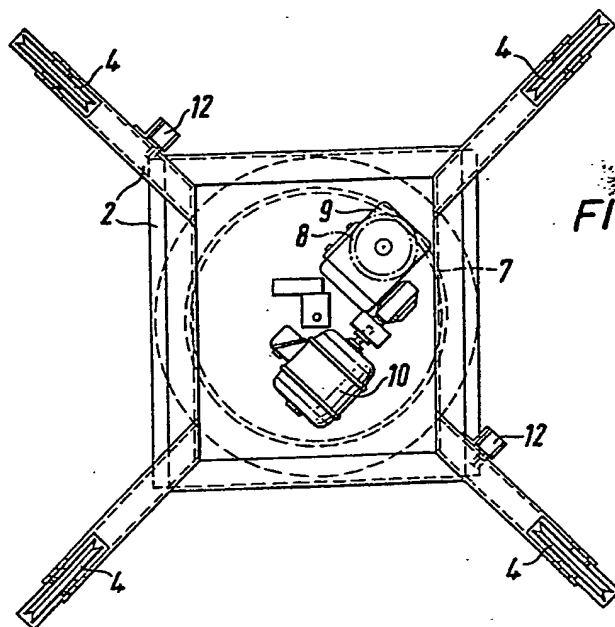
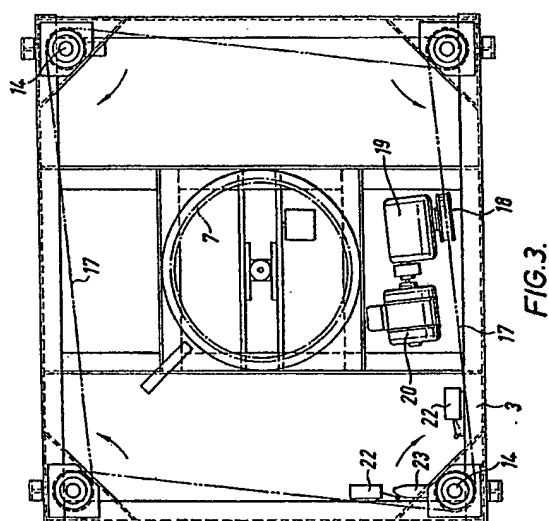
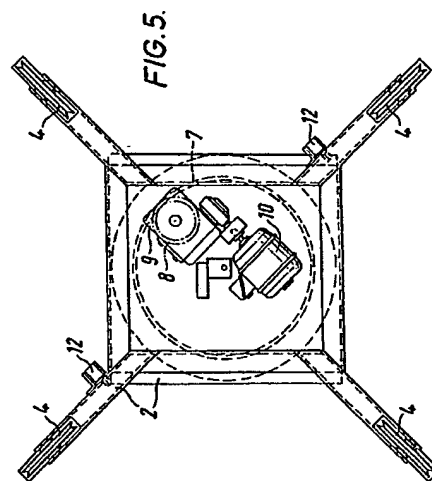
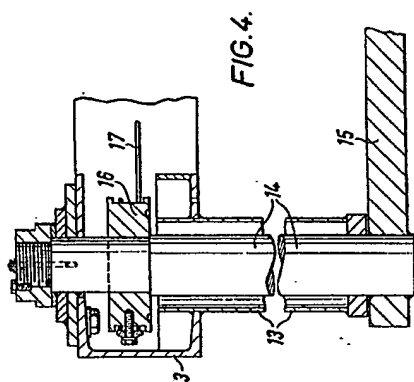


FIG. 5.

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 the Original on a reduced scale
 Sheets 2 & 3



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